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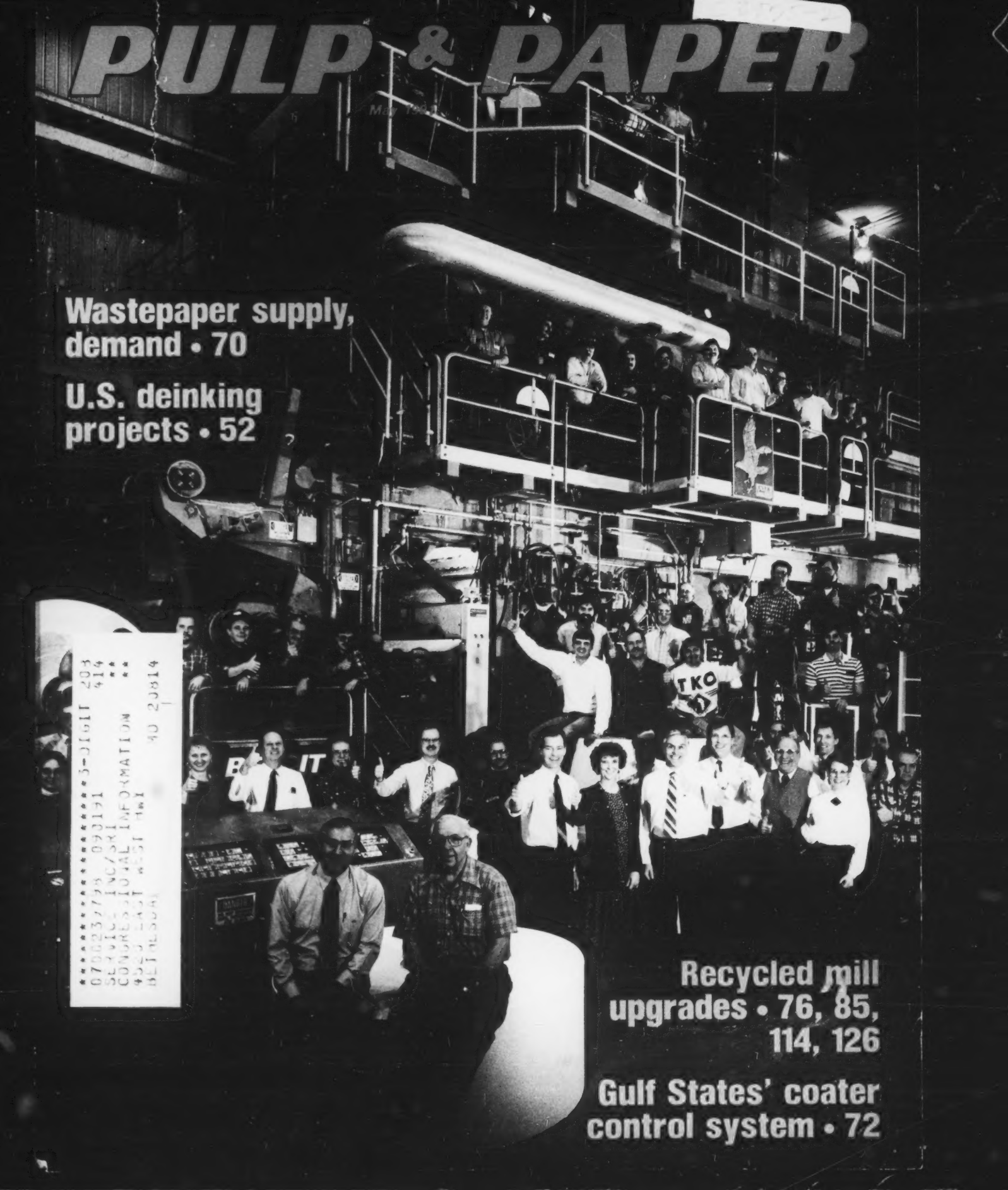

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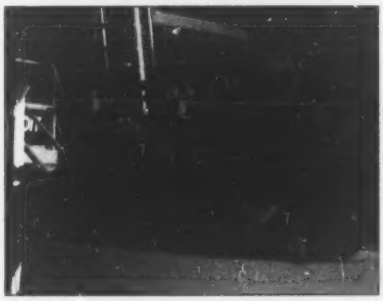

THE COVER

Wisconsin Tissue's recent recycling expansion at Menasha, Wis., (see article on p. 126) featured a new paper machine, converting facilities, and waste treatment operation as well as an expanded deinking plant. **(Photo of mill employees at the new No. 4 paper machine courtesy of Wisconsin Tissue.)**

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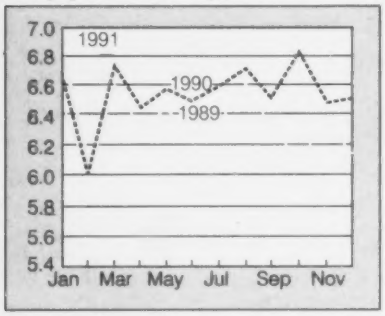
ABP

BPA

MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 6.1 million tons in February, according to the American Paper Institute, down 0.1% from the same month last year. The seasonally adjusted rate of production stood at 78.4 million tpy, down about 900,000 tpy from the rate in January. Paperboard production was up 4.2% through February, but paper output dragged the total down with a 2.6% decline.

Among major grades, lower shipments to magazine publishers and stationery manufacturers cut printing and writing paper shipments 5.0% compared with last year, despite improved demand from book publishers and reprographics users. Uncoated free-sheet fell 5.5% as a result of weak shipments to commercial printers and envelope makers. Containerboard production for the domestic market was up 5.3%, but the strong inventory building evident from October to January ended with a scant 0.1% gain in February. Production of containerboard for the export market remained strong with a 9.9% gain.

Canadian newsprint shipments totaled 698,000 metric tons in February, down 2.8% from a year earlier, while woodpulp shipments climbed 12.8% to 689,000 tons. Operating rates stood at 97% for both newsprint and market pulp mills. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	Feb.	522	2.4	6,586	3.3
Uncoated groundwood (s)	Feb.	132	-7.0	1,658	-6.7
Coated paper (s)	Feb.	564	-2.4	7,184	-2.9
Uncoated free-sheet (s)	Feb.	846	-9.0	10,968	-5.5
Other printing/writing	Feb.	119	-9.2	1,498	-4.3
Total packaging and other paper (s)	Feb.	360	-0.8	4,490	-1.3
Tissue	Feb.	438	-3.1	5,540	-0.2
Total paper	**Feb.**	**2,981**	**-4.0**	**37,923**	**-2.6**
Unbleached kraft paperboard	Feb.	1,624	5.7	20,684	7.0
Semichemical medium	Feb.	453	5.3	5,708	3.5
Bleached paperboard	Feb.	359	0.8	4,509	1.7
Recycled paperboard	Feb.	677	0.0	8,568	-0.1
Total paperboard	**Feb.**	**3,113**	**3.8**	**39,469**	**4.2**
Total U.S. paper and paperboard output	**Feb.**	**6,094**	**-0.1**	**77,393**	**0.8**
PULP, WASTEPAPER & FIBER [2]					
Total U.S. woodpulp production	Jan.	5,541	1.1	66,491	1.8
Market pulp production	Jan.	763	-0.9	9,155	-1.3
Wastepaper consumption at paper/board mills	Jan.	1,833	3.7	21,996	5.2
Pulpwood consumption (cords)	Jan.	8,801	2.9	106,612	2.9
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft²)	Feb.	23.890	-1.2	51.117[6]	-1.3
Containerboard inventories at U.S. box plants and mills	Feb. 1	2,713	14.9		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	Jan.	1,106	-0.6	13,272	-0.6
Imports of Canadian newsprint	Jan.	693	-0.3	8,321[6]	-0.2
U.S. paper exports (including products)	Jan.	646	11.2	7,756	11.2
Exports of unbleached kraft linerboard	Jan.	250	13.6	3,004	14.1
Exports of woodpulp	Jan.	475	13.1	5,706	13.2
Norscan pulp inventories[4]	Feb. 28	1,595	8.1		
Norscan pulp operating rates[4]	Feb.	96%	88%	82%	n.a.
CANADIAN STATISTICS [5] *(reported in metric tons)*					
Total newsprint shipments	Feb.	698	-2.8	1,463[6]	2.0
Operating rates	Feb.	97%	94%	97%	94%
Inventories held by U.S. consumers	Feb. 28	n.a.			
Other paper/board shipments	Feb.	561	0.7	1,164	33.8
Woodpulp shipments (export only)	Feb.	689	12.8	1,380	12.7
Operating rates	Feb.	97%	94%	93%	94%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Coated groundwood: Long-term outlook better than short-term activity

Grade structure: Coated paper with 10% or more mechanical pulp is designated coated groundwood and often is referred to as lightweight coated (LWC), though basis weights for LWC are typically 40 lb or less (sometimes 45 lb). Basis weights can go higher. Most coated groundwood is coated two side (C2S). Coated groundwood paper represented 56% of all U.S. coated paper shipments in 1990.

Coated groundwood grades are classified mostly as Nos. 4 and 5, the latter being the lowest in quality and price. Roughly half of all No. 4 papers produced are groundwood, and virtually all of No. 5 is groundwood. No. 5 papers make up about 49% of the total U.S. coated paper produced. Canada recently expanded its presence in coated paper. Slightly more than 15% of total Canadian printing/writing paper production (uncoated groundwood, uncoated free-sheet, and coated) is coated paper.

Coated groundwood paper is commonly made in the 32- to 50-lb range (25 × 38 in. in reams of 500), although basis weights can run as low as 26 lb and as high as 70 lb. End uses include magazines, Sunday newspaper supplements, catalogs, newspaper inserts, directories, books, and advertising flyers. Coating weight is about 30% of total sheet weight for LWC paper.

Developments in the industry include lower basis weights and introduction of recycled-content coated groundwood paper. Also important was a complaint of dumping filed by U.S. producers against European mills. So far, the complaint has been upheld by the U.S. government agencies reviewing the case.

Production/capacity: Ten leading coated groundwood producers represent 80% of North American capacity. The five largest coated groundwood producers are Champion International Corp., International Paper Co., Consolidated Papers Inc., Repap Enterprises Inc., and Blandin Paper Co. The American Paper Institute projects U.S. coated groundwood capacity will rise in small increments through 1993, topping out at just over 4.6 million tons that year, up from just under 4.6 million tons in 1992.

Most new major coated groundwood capacity had been brought online by the end of 1990, with the next major addition being Boise Cascade Corp.'s 320,000-tpy machine at Rumford, Maine, scheduled for completion in 1994.

Coated groundwood capacity in Canada was 419,000 tpy in 1989 and 584,000 tpy in 1990 and is projected to rise to 645,000 tpy in 1991 and 678,000 tpy by 1992.

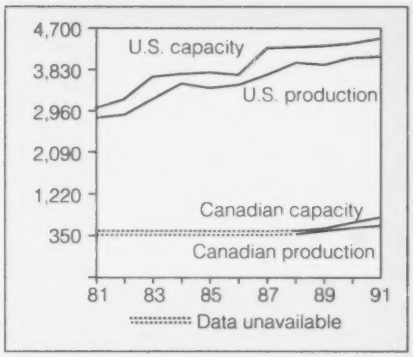
Low-quality coated groundwood grades generally compete with uncoated groundwood papers and have also experienced moderate capacity growth; on the high end, they compete with coated free-sheet papers, which have undergone rapid expansion in recent years and are sometimes available at such cheap prices that customers can easily move up to coated free-sheet from groundwood grades.

Outlook: Magazine publishers and printers purchase about 51% of the total coated groundwood paper produced in the U.S. Magazines and periodicals have been suffering from the effects of economic recession and retargeting of advertising dollars. Magazine ad pages fell 3.7% in 1990 compared with 1989. Similarly, newspaper supplements lost 7.1% in ad pages in 1990.

Coated groundwood as a percentage of total magazine tonnage has been declining slightly, though the total amount of paper continues to increase. In 1989, coated groundwood paper represented 73% of all paper consumed by U.S. magazines but was forecasted to drop to 72% in 1990 and 1991, according to the Magazine Publishers of America. Publishers will increase their use of 32 lb and 40 lb at the expense of weights in between.

Prices: Historical transaction pricing trends ($/short ton, year-end) for coated groundwood paper (34-lb, No. 5 roto paper) are as follows: 1987, $890; 1988, $990; 1989, $966; 1990, $940. ■

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

U.S.	1989	1990	1991e
Production[1]	4,059	4,214	4,303
Capacity[2]	4,341	4,398	4,553
Utilization rate	93.5%	95.8%	94.5%
Imports	539	660	650
Exports	116	140	150
Apparent U.S. consumption	4,482	4,734	4,803
lb/capita	35.97	37.81	38.36
GNP ratio[3]	1.09	1.14	1.13
Canada			
Production[4]	377	501	563
Capacity[4]	419	584	645
Utilization rate	90.0%	85.8%	87.3%
Imports	94	98	100
Exports[4,5]	422	561	583
Consumption[4]	190	207	215

r = revised. 1. *Pulp & Paper* estimates. 2. American Paper Institute. 3. $ billion/real GNP (1982). 4. Canadian Pulp & Paper Assn. 5. More than 95% to U.S.

TOP NORTH AMERICAN PRODUCERS

	Annual capacity (000 tons)	Market share (%)
1. Champion International	720	13.9
2. International Paper[1]	620	11.9
3. Consolidated Papers[1]	580	11.2
4. Repap Enterprises	525	10.1
5. Blandin Paper[2]	335	6.4
6. Bowater	325	6.3
7. Mead	310	6.0
8. Boise Cascade	285	5.5
9. James River	260	5.0
10. Pentair[3]	220	4.2

Capacity share of top five companies: **53.3%**

Capacity share of top ten companies: **80.4%**

North American capacity (1991): **5.198 million tons**

1. *Pulp & Paper* estimate. 2. Subsidiary of Fletcher Challenge Canada Ltd. 3. Niagara, Wis.

New Deinking Projects Proliferate as Industry Meets Recycling Demand

Despite industry downturn and capital spending cuts, North American pulp and paper companies continue to invest in deinking plants

By MARY CORBETT, News Editor

The North American paper industry continues to demonstrate its commitment to using increased amounts of recycled fiber by the abundance of deinking projects planned or proposed to start up in the next couple of years. At least 45 deinking projects will start up in 1991 at new or existing mills, adding 2,879,825 mtpy recycled fiber capacity.

Although many paper companies have cut back on capital spending plans for this year, they are continuing to invest in secondary fiber projects. This is largely due to legislation requiring increased recycled fiber content in newsprint but also because using secondary fiber is becoming more economically viable and more customers are demanding it in tissue and fine paper as well as newsprint and packaging grades.

Commenting on the American Paper Institute's (API) recent capacity survey, president Red Cavaney said, "The steeper rise in paper and paperboard capacity relative to that of total woodpulp reflects the industry's commitment to the increased use of recovered wastepaper as a papermaking fiber."

DEINKING WASTEPAPER SUPPLY. Demand for old magazines (OMG) for use in deinking is increasing, as improved technology removes processing obstacles, such as dealing with difficult-to-disperse stickies and inks that adhere to paper coating. OMG does have benefits in the deinking process for some grades. Clay in OMG stabilizes the bubbles in the flotation process, long fibers in OMG add strength to the next generation of paper, and brightness is generally higher.

OMG is most commonly used in containerboard, combination folding boxboard, and industrial packaging but is finding increased use in newsprint, tissue, and some fine writing paper. ONP will show the greatest percentage gain in consumption of all the grades through 1992 due to the rapid growth in recycled newsprint production slated to come onstream through 1992.

The strong economic advantages in using recycled fiber for tissue, containerboard, and newsprint are not yet clear for printing and writing paper, although environmental motivations may create markets for these grades. To secure a source for what may become a required raw material in the future, mills must establish a good working relationship with local collection services or offices.

Projects listed in Table 1 are definite or very likely to move ahead, pending approval. Many more companies have indefinite plans to install deinking facilities, or they have put projects on hold because of capital limitations at this time. Addition or expansion of deinking capability is often tied to papermaking capacity expansion. Thus, a few companies have postponed deinking facilities along with new paper machines.

Jefferson Smurfit Corp. has put on hold a second recycled newsprint machine along with deinking equipment and a new cogeneration facility at its Pomona, Calif., mill, acquired from Golden State Newsprint last year. The mill is currently in the middle of a two-year, $35-million capital spending program aimed at improving newsprint quality and raising output 10% to 15% but has put any further expansion on indefinite hold.

Smurfit is also in the final round of site selection for a New York State recycled newsprint mill with a deinking plant to start up in 1994. Canadian companies that have postponed projects or kept them on hold include Boise Cascade Canada Ltd., Stone-Consolidated Inc., F.F. Soucy Inc., and Stora Forest Industries Ltd.

Most of the deinking projects to come online this year continue to be in newsprint or market deinked pulp mills that sell to newsprint manufacturers, but projects for other grades, particularly tissue, are increasing.

NEWSPRINT. Recycled newsprint capacity is projected to increase by 150% by the end of 1991; 30% of that capacity will contain at least 40% recycled fiber by the end of 1992, and 85% will be at existing mills that have added deinking capacity to replace virgin-fiber pulping capacity. The remaining 15% will come from greenfield newsprint mills now under construction.

Ten new deinking facilities will start up this year, adding 1,009,825 tpy of recycled fiber capacity. Eight will start up in 1992, adding another 784,350 tpy. Four of these are market deinked pulp mills that would sell

TABLE 1: **U.S. and Canadian deinking projects.**

Company/mill/site	Startup	Deinking capacity (mtpy)	Recycled fiber content (%)	Recycled furnish requirements (mtpy)	Grades
Newsprint					
Abitibi-Price, Thunder Bay, Ont.	May '92	55,000	40	76,550	70% ONP, 30% OMG
Alabama River Newsprint, Claiborne, Ala.	spring '92	100,000	45	140,000	70% ONP, 30% OMG
Atlantic Newsprint, Whitby, Ont.	Jan. '91[1]	146,000	100	73,000	70% ONP, 30% OMG
Augusta Newsprint, Augusta, Ga.	Mar. '91[2]	86,750	variable	115,000	70% ONP, 30% OMG
Bear Island, Ashland, Va.	late '92[3]	43,500	20	60,000	ONP, OMG
Boise Cascade, W. Tacoma, Wash.	1992	70,000	40	109,500	ONP, OMG
Bowater, Calhoun, Tenn.	Sept. '91	109,500	variable	138,700	70% ONP, 30% OMG
Canadian Pacific Forest Products, Gatineau, Que.	late '91	182,500	variable	182,500	70% ONP, 30% OMG
Canadian Pacific Forest Products, Thunder Bay, Ont.	late '91	100,375	variable	100,375	70% ONP, 30% OMG
Cascades/Donohue/Maclaren, Cap de la Madeleine, Que.	early '92	90,000	20	112,900	70% ONP, 30% OMG
Champion International, Sheldon, Texas	1992	138,800	n.a.	208,200	ONP, OMG
Daishowa Forest, Quebec City, Que.[4]	Feb. '92	110,000	variable	120,000	80% ONP, 20% OMG
Daishowa Forest, Port Angeles, Wash.[4]	spring '92	65,000	variable	75,000	50% ONP, 10% OMG, 40% old directories
Inland Empire, Millwood, Wash.	late '91	37,000	40	42,000	ONP
Kruger, Bromptonville, Que.	1992	41,640[5]	variable	52,050	ONP, OMG
Newstech Recycling, Vancouver, B.C.	Nov. '91	122,300	variable	140,000	70% ONP, 30% OMG
North Pacific Paper, Longview, Wash.	Apr. '91	156,000	variable	225,550	ONP
Smurfit Newsprint, N.Y. State (site not chosen)	1994	n.a.	n.a.	n.a.	n.a.
Stone-Consolidated, Shawinigan, Que. (under study)	n.a.	70,000	variable	83,000	70% ONP, 30% OMG
(Indefinite)					
Alberta Newsprint, Whitecourt, Alta.	n.a.	n.a.	n.a.	n.a.	n.a.
Fletcher Challenge, Elk Falls and Crofton, B.C.	n.a.	n.a.	n.a.	n.a.	n.a.
Georgia-Pacific, E. Millinocket, Maine	n.a.	86,750	variable	120,000	ONP,OMG
Manistique (Kruger)[7], Manistique, Mich.	proposed	34,700	100	n.a.	OMG, books, inserts, catalogues
Kenaf Paper, Raymondville, Texas	n.a.	n.a.	n.a.	n.a.	n.a.
Tissue					
Scott, Owensboro, Ky.	proposed	n.a.	n.a.	n.a.	n.a.
Perkins Papers, Candiac, Que.	Aug. '91	48,500	100	100,000	ledger (woodfree)
Atlas Paper, Hialeah, Fla.	June '91	21,000	100	29,200	white leger coated book
Putney Paper, Putney, Vt.	Feb. '91	15,000	100	9,100	white ledger coated book
Marcal Paper, Elmwood, N.J.	n.a.	n.a.	n.a.	n.a.	n.a.
Bay West (Mosinee), Middletown, Ohio	1991	79,810	100	120,000	postconsumer
Fort Howard, Rincon, Ga.	1991	n.a.	100	n.a.	n.a.
American Power, Bala Cynwyd, Pa.	1993	138,800	n.a.	173,500	postconsumer
Orford Recycling, Drummondville, Que.	n.a.	120,000	n.a.	n.a.	n.a.
Fox River Fiber, De Pere, Wis.	July '91	69,400	n.a.	109,500	ledger grades
Mississippi River Corp., Natchez, Miss.	Jan. '91	n.a.	n.a.	n.a.	n.a.
Caithness King, Pejepscot, Maine	1993	190,850	n.a.	273,750	50% ONP, 50% OMG
Caithness King, Midland, Mich.	1992	190,850	n.a.	273,750	50% ONP, 50% OMG
Ponderosa, New York, N.Y.	n.a.	n.a.	n.a.	n.a.	n.a.
Ponderosa, Augusta, Ga.	1992	34,700	n.a.	n.a.	n.a.
Ponderosa, Oshkosh, Wis.	1992	34,700	n.a.	n.a.	n.a.
Ponderosa, Memphis, Tenn.	1992	34,700	n.a.	n.a.	n.a.
Printing/Writing					
Noranda Inc., Thorold, Ont.	proposed	120,000	50 to 100	144,000	ledger, office waste
Noranda Forest Recycled Papers, Thorold, Ont.	1991	32,965	variable	36,500	postconsumer
Patriot Paper, Boston, Mass.[6]	Aug. '91	34,700	100	40,150	white office waste
Riverside Paper, De Pere, Wis.	n.a.	n.a.	n.a.	n.a.	n.a.

1. Will reach full capacity by September '91.
2. Date it will reach full capacity.
3. An additional 410,000 tpy capacity using 200,000 tpy of wastepaper (40%) will come online by 1995 or '96.
4. Produces newsprint and directory paper.
5. An additional 100,000 tpy will come online by 1995.
6. Expansion of existing facilities.
7. Also produces groundwood specialty grades.

their output to existing newsprint mills.

In the U.S. Southeast, Augusta Newsprint Co.'s deinking line at its Augusta, Ga., mill is nearly up to its full capacity of 250 tpd (see article, p. 76). The deinked pulp will enable either of the mill's two paper machines to make up to 40% recycled-content newsprint and can be varied according to a customer's specifications. The $27-million deinking line was purchased from Black Clawson and uses a flotation system with some washing. It will use a mix of 70% ONP and 30% OMG, totaling about 115,000 tpy of wastepaper, which will be obtained from both municipal and private sources.

Alabama River Newsprint Co. in Claiborne, Ala., plans a second-quarter 1992 startup for its $56-million deinking facility. The plant will produce 100,000 tpy of deinked pulp to supply its 220,000 tpy of newsprint with a 45% recycled fiber furnish. The combination flotation and washing system will make use of about 140,000 tpy of ONP and OMG sourced partly from wastepaper brokers and partly from municipal reclamation systems. Parsons & Whittemore and H.A. Simons are currently doing the engineering, and suppliers are being chosen.

Bowater Southern's Calhoun, Tenn., deinking plant is under construction and will start up in September. The plant will make 109,500 tpy of deinked pulp, using 138,700 tpy of ONP and OMG that is sourced from wastepaper brokers. The $74.5-million facility includes a dual flotation and washing system on alkaline, then on acid, by Black Clawson and a pulping drum by Ahlstrom. The engineering was done by CRS Sirrine. The sludge and ash generated by the facility will be landfilled, although boiler capacity may be increased in the future so the waste can be burned.

In the Northwest, Inland Empire Paper Co. is installing a new deinking plant at its 66,000-tpy newsprint mill in Millwood, Wash. It will use 42,000 tpy of ONP to produce 37,000 tpy of deinked pulp. The company may have to go a considerable distance to find sources of ONP because North Pacific Paper Co. planned to start up a 156,000-tpy deinked pulp facility in Longview, Wash., in April. North Pacific, a joint venture of Weyerhaeuser Co. and Jujo Paper Co. Ltd., will source its 225,550 tpy of ONP through Weyerhaeuser. The deinking line is tied to a third paper machine, which will bring total capacity to 2,000 tpd of variable recycled-fiber content newsprint.

Daishowa America Co. Ltd. is starting up a $40-million, 65,000-tpy deinked pulp facility at Port Angeles, Wash., in spring 1992. The facility will use 50% ONP, 40% old directories, and 10% OMG for its newsprint/directory mill. Daishowa has developed its own top secret deinking technology, which will enable it to use old directory paper. A spokesperson for the company did say it is a combination flotation and washing system. Daishowa is also building a deinking facility at its Quebec City, Que., newsprint/directory paper mill. This facility will use 120,000 tpy of wastepaper from Canada and the U.S. (80% ONP and 20% OMG) to produce 110,000 tpy of deinked pulp. The recycled fiber content can be varied according to a customer's needs.

Atlantic Packaging Products Ltd. in Whitby, Ont., is starting up its 146,000-tpy deinked pulp line. It uses 73,000 tpy of ONP and OMG sourced from community recycling programs. Voith provided the engineering and supplied the combination flotation and washing system. The company is not yet up to full capacity on its 400-tpd paper machine, which produces 100% recycled newsprint.

"These companies [that include a percentage of recycled fiber] will be in a much better position than if they sit and wait until the legislation comes along and says include 60% recycled fiber."

DEINKED PULP. Legislation is driving newsprint makers to include high recycled-fiber content, but those who cannot afford to build their own deinking facilities may come to depend on market deinked pulp manufacturers. Paul Stern, Caithness King Co.'s environmental scientist, said, "A lot of publishers are under pressure from their readers to come up with recycled-fiber content paper. We believe companies will be to an advantage to begin now proactively including a percentage of recycled fiber. These companies will be in a much better position than if they sit and wait until the legislation comes along and says include 60% recycled fiber."

Market deinked pulp manufacturers are confident there will be a continued demand for recycled content and that the most efficient and economical way to provide it, for mills that don't have a tremendous need, is with deinked market pulp. Stern said, "It's either a make or buy decision. At our economy of scale we can sell them the pulp for a lot cheaper than if they had to make it themselves."

Caithness King is building two nearly identical market deinked pulp facilities—one in Midland, Mich., and the other in Pejepscot, Maine. Both projects will produce 550 tpd of deinked pulp, using 750 tpd of wastepaper—50% ONP and 50% OMG. Construction will begin in Michigan in July, and the plant will start up 1992. The Maine mill will start up in 1993. Bechtel is doing the engineering and suppliers are currently being chosen. Customers are being sought in production of value-added grades, such as directory, SCA, SCD, and coated Nos. 4 and 5, but no contracts are finalized. The process is a

multi-stage washing and flotation system using hydrogen peroxide and sodium hydrosulfite for brightness.

Ponderosa Fibres of America Inc., North America's largest market deinked pulp producer, is planning 100-tpd expansions at three mills (Augusta, Ga., Oshkosh, Wis., and Memphis, Tenn.) and has proposed a new mill for the New York City area. The company is experiencing increasing demand for its product from printing/writing, tissue, and other specialty grade manufacturers. It considers itself at an advantage since anticipated legislation is prompting papermakers to use more recycled fiber, but many cannot afford to build deinking facilities. The company currently makes 700 tpd of deinked market pulp at four mills using primarily colored ledger, white ledger, and poly-coated board.

PRINTING/WRITING. A lack of federal guidelines and the problems with a clean source of secondary fiber in printing/writing paper have caused these grades to lag behind tissue and newsprint in secondary fiber usage. Before these manufacturers make the investment in deinking facilities they must be assured that a dependable source of quality wastepaper, such as office waste, is available.

Recyclable paper products account for approximately two-thirds of all office waste, yet improper sorting may cause contaminants (glues, tape) or paper of unacceptable quality to enter the deinking process. The situation is improving as offices and commercial buildings are jumping on the recycling bandwagon. Source separation is the key factor in the effective utilization of office waste. Pickup is often supplied free by waste collection groups, and companies may save on waste disposal costs. Also, office workers are demanding that recycling bins be made available.

Noranda Forest Inc. has created a new division called Noranda Forest Recycled Papers to handle its recycling efforts at its integrated Thorold, Ont., mill, which includes three paper machines and a deinking facility. The company is currently implementing process changes to bring the capacity up to about 95 tpd from 25 tpd last year and will use about 150 tpd of wastepaper by the end of 1991.

Don Duncan, vice president-operations at the mill, said that until last year the company had not been selling the paper as recycled. "By making the move to become an Eco-Logo qualified producer with 50% deinked fiber, it has allowed us to put far more through that deinked plant and maintain quality. It's interesting that the dirt specks that used to be a problem in the past are no longer a problem now that we're selling it as recycled paper."

The company had announced plans more than a year ago to construct a 120,000-tpy greenfield wet-lap deinking facility in Thorold, but that project will now be considered separately, falling under Noranda Inc. Duncan said the company is not prepared to make such a large investment at this time, and it wants to try introducing new products through the integrated facility first. The proposed new facility would consume approximately 144,000 tpy of ledger and sorted office waste to produce a sheet with 50% to 100% recycled fiber content and would also sell market pulp. Duncan said since the product produced by the new greenfield facility will compete on the pulp market, that investment will involve a long-term look.

TISSUE. More than half of the tissue supply coming onstream from 1990 to 1993 will make use of deinked wastepaper, as more tissue makers turn to 100% recycled in response to environmental pressures, procurement guidelines, and customer demand. According to API's 1990 capacity survey, eight new tissue machines will come onstream between 1990 and 1993, raising capacity from 5.976 million short tons to 6.349 million short tons. Four of these machines will use deinked wastepaper to make tissue.

Three-quarters of the recycled fiber furnish used in tissue production is supplied from pulp substitutes and high-grade deinking grades; mixed paper, ONP, and OCC provide the rest. Fort Howard Corp., Chesapeake Corp., Pope & Talbot Inc., and FSC Paper Co. make only 100% recycled tissue, while Scott Paper Co., James River Corp., Procter & Gamble Paper Products Co., and Georgia-Pacific Corp. include an average of 20% wastepaper in their tissue.

Construction began last spring on a 48,500-tpy deinking facility at Perkins Paper Ltd.'s Candiac, Que., tissue mill. The facility will start up Aug. 1 in conjunction with a new Valmet twin-wire, 6,500-fpm tissue machine. The combination flotation and washing system includes equipment from Hymac, Black Clawson, Fiberprep, and Escher Wyss and was engineered by Joseph Miller Consultants of Montreal. The facility will make use of 100,000 tpy of woodfree wastepaper sourced from Montreal and Toronto as well as the northeastern U.S. Perkins has been making 100% recycled tissue since 1971.

Mosinee Paper Corp. is expanding its Bay West subsidiary in Middletown, Ohio, including a $17-million deinking plant, due to be completed in third-quarter 1991. When added to the existing 100-tpd plant, the combined operation will produce 330 tpd of recycled pulp for the mill's towel and tissue machines. The mill will use 450 tpd of varying grades of postconsumer waste.

A couple of small tissue manufacturers are expanding deinking capability. Putney Paper Co. in Putney, Vt., raised its capacity 40% last year to about 50 tpd with a machine rebuild. The expanded deinking system will produce about 44 tpd of deinked pulp for its 100% recycled tissue. Escher Wyss supplied the flotation system. Atlas Tissue Mills in Hialeah, Fla., is in the startup phase of a new flotation deinking line from Black Clawson. It will use 80 tpd of ledger and coated book wastepaper to produce 100% recycled tissue. ■

Wastepaper Market on Rocky Road: Unusual Conditions Impede Recovery

U.S. wastepaper markets have never experienced the changes and challenges they are presently, while long-term prospects are even more uncertain

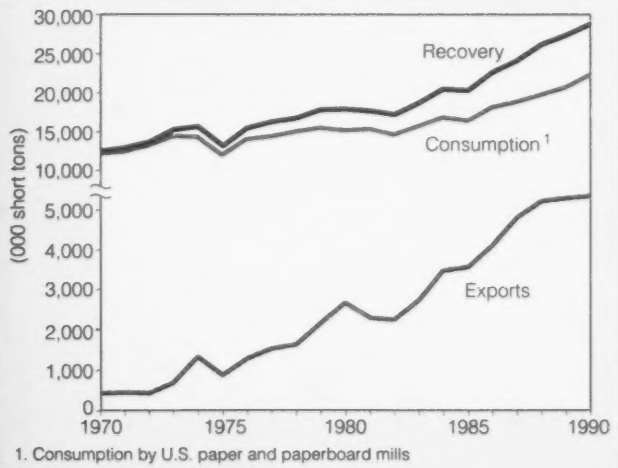
By DEBRA A. GARCIA, Senior News Editor

Pick almost any facet of the wastepaper market today, and it will have changed remarkably in the space of just a couple of years. Since the latter part of the 1980s, the business of collecting, sorting, baling, shipping, selling, and consuming wastepaper has undergone drastic adjustments. This has caused an upheaval the industry has never before experienced—and the transition has just begun. In the next decade, the industry will face even more challenges. How it will fare is anyone's guess.

Since 1987, when public recycling programs began to grow in leaps and bounds, the wastepaper business has gone downhill. It was most noticeable in old newspapers (ONP), the grade that municipal curbside recycling programs have been most successful at generating. The price mills pay for No. 6 newsprint, the lowest ONP grade and the one identified with curbside collections, peaked at $60.00/short ton, f.o.b. seller's dock, in New York, N.Y., in late 1987. Since then prices have fallen steadily to their current level of $0.

Recovery of ONP shot up 86% between 1983 and 1990, according to the American Paper Institute (API). Figures released by API earlier this year indicated that ONP collections were up about 500,000 short tons in 1990 to a record level of 5.9 million tons. This represents a recovery rate of 45% of the 13.3 million tons of newsprint used in the U.S. last year. API expects the recovery rate of ONP to exceed 50% by 1995, when the industry plans to recover 40% of all paper and paperboard it produces. This will mean that total collections will have to increase from the 28.9 million tons reported for 1990 to approximately 40 million tons in 1995.

FIGURE 1: **U.S. wastepaper recovery, consumption, and exports, 1970-90 (000 short tons).**



1. Consumption by U.S. paper and paperboard mills
Source: American Paper Institute

IS 40% RECOVERY ATTAINABLE BY 1995? Achieving this goal will take not only a 5% annual growth in domestic consumption but also a 10% annual growth in exports, according to Bradley N. Currey, president of Rock-Tenn Corp. "Whether this happens is not all under our control, especially exports," he said.

There's no doubt that domestic consumption is on the rise, particularly for such grades as ONP and old corrugated containers (OCC), but export growth will likely hinge on a number of factors that are not entirely predictable. Presently, for instance, the Persian Gulf war has caused a shortage of steamship containers that has put a significant dent in wastepaper exports this year. Rebuilding Kuwait will continue to put a strain on container availability in the foreseeable future. A drop in exports in 1991, after more than a decade of growth (Figure 1), would not be inconceivable given the container situation, and this could cause a glut of paperstock on the domestic market. Given this scenario, prices would continue to fall, and a number of smaller operators in the wastepaper collection business would fail—possibly impeding progress in raising recovery rates.

For mills gearing up to use increasing quantities of wastepaper, future success depends on securing adequate and reliable sources of good-quality wastepaper. In the past two years, many mills have either acquired firms in the wastepaper collection business; signed agreements with recyclers, such as Laidlaw Inc., to handle paperstock procurement; entered into joint ventures with collection companies; or created their own internal procurement divisions.

OCC SHORTAGES ARE BIG CONCERN. One sector of the paper industry that is most worried about future paperstock shortages appears to be containerboard producers. Shortages of OCC, which is used in producing boxboard, corrugating medium, and linerboard, are likely by the mid-1990s. OCC supplies are tight already even at the current 50%-plus recovery rate, and more capacity to consumer OCC is coming onstream. This situation could change, however, if exports of OCC drop. However, both domestic consumption and exports of OCC are expected to grow in 1991. Future growth in OCC collection, though, could be impeded by contaminants such as hot-melt glues, tar tape, and coated, wax, and film laminates, according to Currey.

The tightness in OCC markets has kept prices relatively firm during the current down cycle for wastepaper. Prices in the New York City region, for instance, have declined only about 50% since they peaked in late 1987 at $70 to $80/ton. This compares with a 100% drop in No. 6 newsprint prices during the same period (Table 1). The amount of OCC consumed by domestic paper and paperboard mills in 1990 reached 10.447 million tons, 46.7% of the total wastepaper consumed. Consumption of other grades within the industry was considerably lower, with ONP being the highest at 4.679 million tons, or 20.9% of the total.

During the period 1990-93, total wastepaper consumption is expected to increase at a pace averaging 7.2%/year, more than twice the growth rate of any other fiber source, according to API. By 1993, wastepaper will comprise 29.3% of all fiber consumed by U.S. mills. According to API's 1990 "Paper, Paperboard, Woodpulp Capacity Survey," wastepaper use by the U.S. paper industry will rise from 20.442 million tons in 1989 to 27.148 million tons in 1993.

Consumption growth will be greatest among the lowest grades of wastepaper. OCC consumption is expected to increase at the rate of 6.3%/year for the period 1989-92, reaching 13.298 million tons in 1993. According to API, capacity for recycled linerboard made exclusively from wastepaper or with a high wastepaper content is expected to increase at a high annual rate of just over 39% to reach 1.453 million tons in 1993. Capacity to produce recycled newsprint, meanwhile, will boost ONP consumption almost 50% between 1990 and 1993. During this period, ONP use will rise 9.4%/year to 5.353 million tons.

MIXED PAPER PROVIDES GREATEST CHALLENGE. Perhaps the grade with the greatest potential but the biggest challenge is mixed paper. This category has always contained grades that were too costly to presort and were therefore sold to mills where bulk rather than appearance was a priority, such as in construction grades, setup boxboard, and the underside of clay-coated folding carton. The growth in office presort programs is helping to unmix mixed papers and allow them to be reclassified as higher grades (ledgers, hard whites, etc.). But quality will remain a problem until better programs can be implemented in offices and other collection centers. This would boost demand for these grades from such users as tissue and printing/writing paper producers. API expects mixed paper use in the paper industry to rise from 2.356 million tons in 1989 to 3.007 million tons in 1993.

Growth trends in the remaining two major categories of wastepaper, high-grade deinking and pulp substitutes, will depend largely on how the issue of postconsumer waste is settled.

Consumer groups are advocating that only paper consumed by the end user and tossed out for disposal should be considered as recycled fiber in recycled-content standards being drafted by local, state, and federal legislators. The paper industry, however, argues that preconsumer waste, which includes discards from industry prior to use by the end user, will end up in the solid waste stream if not reused, making the issue of preconsumer vs postconsumer moot.

API projects that mill use of pulp substitutes will grow from 2.889 million tons in 1989 to 3.318 million tons by 1992, while consumption of high-grade deinking will rise from 1.691 million tons to 2.307 million tons during the same three-year period.

The future of the wastepaper business will depend on the regulations being adopted to govern recycled-content standards and other requirements, technology improvements that will have an impact on the amount and types of wastepaper grades that can be used to produce various grades of paper and paperboard, customers' buying habits dealing with their preference for either recycled or nonrecycled grades of paper and paperboard, the results of the restructuring currently under way as producers and related industries establish their positions in the marketplace, and uncertain factors such as steamship container availability. ■

TABLE 1: **U.S. wastepaper prices for selected grades ($/short ton, f.o.b. seller's dock, New York, N.Y.).**

	No. 6 old newspapers	Old corrugated containers	Hard white shavings	Computer printout (with laser)
1991				
1Q	$0	$35.00	$248.33	$172.50
1990				
4Q	−1.33	23.33	266.67	175.83
3Q	−4.67	20.00	270.00	185.83
2Q	−1.66	16.66	273.33	211.66
1Q	−5.00	12.50	308.75	235.00
1989				
4Q	−16.00	17.50	327.50	255.00
3Q	−5.00	20.83	358.33	260.83
2Q	9.16	29.16	358.00	230.83
1Q	17.50	35.00	355.00	210.00
1988				
4Q	35.00	43.33	335.00	213.33
3Q	45.83	55.83	343.33	236.66
2Q	50.00	51.66	323.33	230.00
1Q	58.30	52.50	320.00	221.66

Prices are quarterly averages of paper and board mill purchase prices, f.o.b. seller's dock, exclusive of delivery charges, and they represent contract rather than spot or premium sales.

Source: *Pulp & Paper Week, Paper Recycler.*

Capacity Upsurge, Flattening Demand Mean Competitive Market Pulp Sector

Western Europe and Asia will remain growth areas, but supply is forecast to outpace demand through the early 1990s

By KRISTIN LOEFFLER

The market pulp sector of the pulp, paper, and paperboard industry is a volatile one, and the 1990s is promising to be one of the most rapidly changing periods in the history of the grade. Because market pulp is a world commodity, regional producers are subject to changes in the world supply and demand balance.

This balance is changing very rapidly. Such problems as oversupply and the proliferation of alternatives to market pulp will continue to plague producers over the next ten years. But while demand is flattening in some regions, Western Europe and Asia look to be potential areas for growth.

To examine the current market pulp market and discuss some of these problems, *Pulp & Paper* interviewed Ken Lowe, editorial director of the *Pulp & Paper Forecaster* Services and author of "Market Pulp in the Competitive 1990s," an in-depth report analyzing market pulp industry trends in the next decade.

Ms. Loeffler is editorial assistant, Forecaster Services of Miller Freeman Inc., San Francisco, Calif.

Note: All tonnage figures are metric.

P&P: *Much of the market pulp capacity expansions planned in the mid- and late-1980s have been coming online recently, while even more are expected to start up in the next few years. How is this changing the supply and demand balance?*

Lowe: Excess capacity will plague producers into the mid-1990s. From 1990 to 1995, the industry plans to add nearly 7.5 million tons of chemical paper-grade (CPG) pulp capacity, while demand is expected to increase by only 6 million tons. This will create competitive conditions—operating rates in the low 90s or lower through the mid-1990s—and downward pressure on prices.

An estimated 80% of all new capacity will be added in North America and South America. By the year 2000, the two regions will supply more than 60% of the world's market pulp. Nordic and Western European producers will be a smaller factor in world markets since much of their capacity will be integrated or consumed as captive pulp.

Southeast Asia will make strong gains, but much of this capacity will be directed to local consumption needs as printing/writing and tissue demand in this area continues to outpace demand in other areas. The Norscan producers supply nearly all of the bleached softwood kraft market pulp consumed—90% of shipments in 1989.

TABLE 1: **World demand for CPG market pulp by major consuming regions.**

	1989	2000
Total	26,290	35,856
Canada	946	1,211
U.S.	5,150	6,544
Western Europe[1]	12,070	15,908
Latin America	1,320	2,288
Africa	160	264
Asia[2]	6,015	8,719
Others[3]	625	922

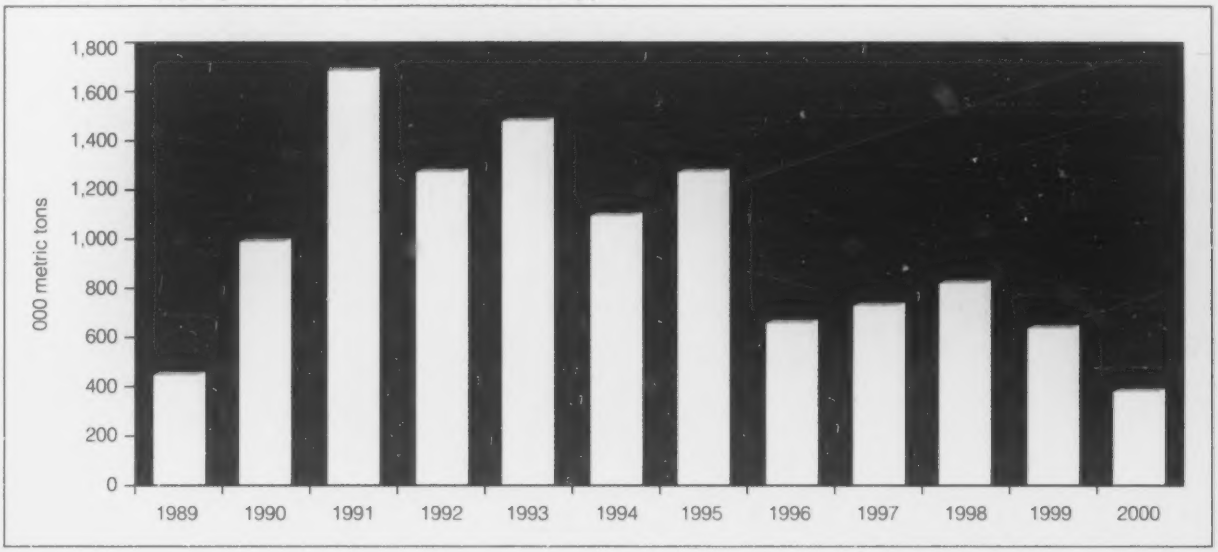
1. Includes Nordic countries.
2. Includes Japan and China.
3. Includes Oceanic and Eastern Bloc countries.

TABLE 2: **World demand for CPG market pulp, average annual change (%).**

	1974-88	1981-90	1990-2000
Total	2.8%	2.7%	2.7%
Canada	3.7	3.2	2.4
U.S.	2.5	2.4	1.8
Western Europe[1]	1.7	2.4	2.3
Latin America	4.9	4.2	3.7
Africa	1.6	−1.0	4.7
Asia[2]	6.7	4.9	3.8
Oceania	1.1	−1.3	−0.2
Others	0.8	−2.2	7.3

1. Includes Nordic countries.
2. Includes Japan and China.

FIGURE 1: **World paper-grade market pulp capacity increases by year.**



However, shipments from non-Norscan producers have more than doubled since 1980, growing from 500,000 tons to 1.4 million tons in 1989. But from 1989 to 1995, 3.7 million tons of bleached softwood kraft market pulp will be added, 65% of which will be from Canadian and U.S. producers, and 76% of all new softwood kraft capacity will be added by Norscan producers.

P&P: *You mentioned South America as an area of significant production increases during the next decade. How much of the planned capacity will come from that region?*

Lowe: Brazil leads the expansion in bleached hardwood pulps. Fifty percent of the 4 million tons forecast to come online during the next five years will be from South American producers. Bleached eucalyptus kraft market pulp additions, mainly in Brazil, will be extensive—2 million tons between 1989 and 1995 and 3 million tons by the end of the decade if all scheduled projects are completed.

By the early 1990s, an excess of bleached hardwood market pulp capacity will exist. Therefore, some of the capacity scheduled in North America and Brazil will be integrated or sold as captive pulp.

P&P: *What steps must market pulp producers take to counter this oversupply problem?*

Lowe: In past periods of oversupply, producers have taken corrective measures, such as integrating capacity, shutting down marginally profitable operations, and postponing or canceling expansion projects. These are likely to be called on again to lessen the impact of excess capacity and limit the drop in operating rates and prices.

Unless producers undertake some preventive actions, operating rates should remain in the low 90s through the mid-1990s. There are a number of variables that could help or hinder a rebound in rates.

Year to year, demand can vary by as much as 5% from historical trend levels due to unexpected short-term variations—strikes or inventory pulldowns, for example. But if demand is affected by factors such as very strong growth in developing countries or increased pulp substitutions, permanent changes in demand would result.

Our forecast is the most likely scenario based on our model, but there is about a 15% chance that the figure will run at the statistically higher end of the model forecast. According to the more pessimistic forecast—that is, if capacity expands at forecast levels and demand follows projected trends, operating rates will decline to the mid 80s by 1994.

P&P: *Will producers in all regions be affected equally?*

Lowe: Producers in the U.S., and to some extent in Canada, are sheltered because of the declining value of the U.S. dollar, which makes prices for U.S.-produced pulps lower in local currencies. From 1986 to 1989, for example, the U.S. dollar price for northern bleached softwood kraft (NBSK) pulp leaped 76% but grew by only 52% in Japanese yen and by a mere 28% in German marks.

Prices in U.S. dollars for all grades of CPG pulp should continue the decline that began in 1990 into the early part of the decade, but the rates will vary among grades. For instance, prices in domestic markets for NBSK pulps historically average about $35/ton higher than those for southern pine pulps. In early 1991, the price differential was at a record $100/ton, and due to the higher manufacturing cost of NBSK, it will remain $75 to $100/ton higher unless the currencies of Canada and the Nordic countries are devalued against the U.S. dollar.

P&P: *What factors are affecting demand for market pulp, and are there geographical regions where demand is expected to increase significantly?*

Lowe: Growth within any region of the world primarily depends on how fast demand for printing/writing papers in that region increases and on the ability of the region to produce pulp for internal use. Printing/writing and tissue grades consume about 84% of all CPG market pulp.

During the last five years, the highest rates of growth for printing/writing grades, and hence the strongest demand for market pulp, has been in Asia and Western Europe. Western Europe will continue to be the largest consumer, but demand in Asia and other areas outside North America will grow at increased rates. Demand for paper-grade market pulps in other paper and board grades, such as newsprint, packaging grades, and boxboard, will grow only marginally.

P&P: *Mechanical pulping has come on strong in the past few years, and numerous producers have come online with bleached chemi-thermomechanical pulp (BCTMP) capacity. How has the growth in mechanical pulps affected the market pulp market?*

Lowe: On a tonnage basis, demand for CPG pulps will remain strong since few other fiber sources can provide quality comparable to that of CPG pulps. But the use of higher-quality mechanical pulps and the increased use of wastepaper and fillers will reduce the percentage of CPG market pulp used in printing/writing and tissue grades.

For instance, each ton of printing/writing and tissue paper produced in 1989 consumed about 0.34 ton of CPG market pulp. In the late 1970s, the ratio was 0.50 ton, and by the year 2000, it will have declined to 0.29.

The worldwide demand for paper-grade mechanical pulps, including CTMP, is now about 2.2 million tpy and is forecast to grow by about 4 million tpy by the year 2000. In 1990, 7% of world paper-grade market pulp demand (mechanical and chemical) was for mechanical, and by the year 2000, the ratio will have increased to 10%. ■

More information on market pulp
Interested readers can obtain more information on this report, including a free prospectus, by contacting Ola Jane Gow, Forecaster Services, Miller Freeman Inc., 600 Harrison St., San Francisco, Calif. 94107; Phone: (415) 905-2278; Fax: (415) 905-2240.

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Talc Use in Coating Formulas Gains Popularity in European Paper Mills

Combined with kaolin and carbonates, talc as a coating pigment is attracting increased attention, while markets for filler talcs remain stagnant

By WILHELM SCHOBER

For decades, talc has been used as a filler for various types of paper. Among the grades for which it has been employed are wood-free paper, wood-containing supercalendered (SC) paper, base paper for coating, and white top layer for folding boxboard and wallpaper. In all these applications, talcs compete with kaolin and carbonates.

Regions with locally available talc usually have the highest consumption levels. In Europe, these producer countries are Finland, France, and Italy, where domestic suppliers offer medium-brightness (72% to 80% ISO) talc with particle sizes down to 30 micrometers. Filling rates can be as high as 25%.

With increasing numbers of mills switching to neutral sizing and with restrictions on the use of talc in copying paper, filler talc consumption dropped in the early 1980s in Europe. Talc continues to be of vital importance in only a few fields of application, notably as a filler for SC rotogravure grades.

In North America, the market for filler talc is also weak because of availability of cheap prime-quality kaolin. But both Southeast Asia and India have become very important for the talc supply industry. More than 800,000 tpy are used as paper fillers in this Asian region, with Japan and Rep. Korea accounting for 50% of total consumption.

LOW ABRASION IS THE KEY. Talc's success in this market is partly due to its low abrasion compared with most other locally available filler minerals—mainly dry-ground carbonates and kaolin, which often contain hard impurities. Papermakers are able to capitalize on the primary advantages offered by talc:

- Good wire retention and sheet formation
- Longer wire life because of low abrasion
- Improved smoothness and printability of the paper produced
- High brightness (80% to 87% ISO).

The addition of talc to a more abrasive mineral filler can help reduce wire abrasion and also leads to higher retention.

Looking to the future, although carbonates are gaining in importance in Japan, talc fillers are also receiving added impetus. It appears that the Southeast Asian countries and Japan will use more filler talc in the future, especially grades with low abrasion.

COATING: FINNS LEAD THE WAY. Talc is typically used as a coating pigment for rotogravure printing paper grades. The first positive results for coating came from Finland in the production of lightweight coated (LWC) paper. Currently, talc is used as one constituent in a coating formula in combination with kaolin and carbonates. It typically accounts for 25% to 40% of the formula.

Using kaolin—the main coating pigment—for comparison, Finnish technicians have found that talc has the following characteristics:

- Reduced gloss, increased opacity
- Smoother surface
- Good printability (Heliotest, Winston)
- Excellent press runability
- Softness and a "shape" factor, making for better calendering
- Good coverage with low substances.

When using talc, it is also important to remember the following:

- It is more expensive and difficult to wet hydrophobic talc than kaolin.
- The specific behavior of talc requires careful management of its rheology, given the higher viscosity, and leads to a higher risk of dilatant behavior at high speeds. Since more air is bound to the mineral slurry, higher dosages of defoamer are needed. Also, different additives and binders are required to make talc compatible with carbonates and clays.
- The recycling of talc-coated wastepaper leads to higher chemical loads.

Most of these problems have been solved over the past few years, but some still persist. Despite this, demand for talc coating pigments is rising steadily.

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TABLE 1: **Talc consumption in the pulp and paper industry.**

	Europe 1986	Europe 1990	East Asia 1989	N. America 1989
Filler	450,000	300,000	850,000	5,000
Pitch control	145,000	165,000	100,000	140,000
Coating	60,000	90,000	0	0

SUPPLY EXCEEDS DEMAND. Talc resources are extensive, but large-scale occurrences of high-quality talc are rarely found. The paper industry is an important outlet for the talc-producing industry worldwide, accounting for nearly 50% of sales (Table 1). The market has become highly competitive during the past few years, and rationalization among suppliers has led to a battle for market share rather than a drive for better prices.

People's Rep. China and Rep. Korea supply a large share of the low-cost filler talcs in the Far East. Western Mining Corp. (WMC) has a large-scale (200,000-tpy), high-quality ore body, with a good location in western Australia, serving Southeast Asia and Japan. India's major talc producer, Golcha, is also following the growing market, producing nearly 200,000 tpy. In addition, it plans to expand its product line to include micronized grades.

The North American market is mainly served by Cyprus (530,000 tons in 1989) and Pfizer. Meanwhile, European talc producers are feeling the effects of rationalization—the number of suppliers has fallen dramatically, and a few names have disappeared as independent companies. Most European producers have specialties for the pulp and paper industry. The main players are listed as follows.

Cyprus, Belgium, has always had a large share of the pitch-talc market (see sidebar). Until 1986, large quantities of crude talc were imported from WMC's mine at Three Springs, Australia, and from Cyprus Minerals Corp., U.S., the parent company. Now it appears that mainly Spanish (Dimta, 25,000 tons) and U.S. talcs are being imported and processed.

Westmin Talc, a subsidiary of WMC, recently started its own local grinding operation in the Netherlands. The facility imports, micronizes, and markets Australian talc.

Finnminerals has a large market share that increased further after it took over Partek's Myllykoski operation at the end of 1990. The whole company now produces nearly 400,000 tpy, with all grades displaying above-average brightness.

The Talcs de Luzenac group, part of RTZ-Borax, mainly supplies French and Benelux paper mills from its French plant (330,000 tons). The recent takeover of Val Chisone, Italy, increased its influence on the Italian market. The pitch talc market is supplied by Austrian subsidiary Naintsch, which predominantly processes dark local talc and white talc imported from Golcha and China.

Industria Mineraria Italiana Fabi is one of the rare family-owned talc companies. The mine's large resources and a program encouraging investment in micronized grades have resulted in increased interest by the paper industry in IMI-Fabi's pitch control products. Total output is around 65,000 tpy.

QUALITY RISES, PRICES FALL. Traditional European and North American talc suppliers have been looking for increased market share during the past four years. Prices for all types of talc have fallen steadily, while average brightness and fineness have increased.

The profitability of the industry has been adversely affected. Economic consolidation is bound to follow the period of rationalization, and price increases of at least 10% in the coming years can be expected.

Paper mills risk raising their dependence on fewer potential suppliers, with the price/ton remaining the dominant factor in the selection of raw materials, rather than others, such as cost/performance and supplier/customer relationships.

Filler talc prices (as of February) vary from $70/ton to $200/ton, depending on brightness, fineness, quantity, and competition with other industrial minerals, predominantly kaolin. As brightness and abrasion specifications become more important, talc prices will probably increase accordingly.

WHAT DOES THE FUTURE HOLD? Consumption of pitch control talc (see sidebar) is expected to grow more quickly than paper consumption itself, since faster paper machines, demands for higher quality, and environmental measures will favor its use. Papermakers will increasingly focus their attention on minerals wherever possible to reduce chemical and wastewater loads. This trend will be global.

The trend toward neutral sizing has leveled off, and demand for filler talc will recover in some important niche markets. Inexpensive, high-quality talc is avail-

TABLE 2: **Development of pitch talc prices in Europe.**

	1986 DM/ton	1990 DM/ton
W. Germany	430-650	380-500
Italy	500-600	380-500
U.K.	600-700	600-700
Benelux	400-600	400-450
Sweden	500-700	400-500

able in Asia, and demand will grow substantially.

The development of coating talc is close to a breakthrough. How quickly it is achieved will depend on the R&D efforts of the paper, mineral, and related chemical industries. ■

Pitch control use still growing

The term "talc" does not convey the diversity of this mineral in its natural state. On one hand, talc is a pure magnesium silicate found in India, China, Australia, the U.S., and other countries. On the other hand, it is a general term for a polymineralic rock.

Talc is most frequently accompanied by "charlotte," in which the magnesium ion is partly replaced by aluminum (France, Austria, Italy). Chlorite also has a lamellar structure with properties very similar to pure talc. There are many theories about the quality of talcs and chlorites, but in practice the grinding system is of similar importance to the mineralogy.

An important and traditional use for talc is in pitch control in pulp and paper mills (softwood and hardwood). One of talc's valuable surface properties is its ability to absorb organic impurities. Using talc reduces machine downtime and improves product performance.

Platy talc is added to process water when the pitch is still in a dispersed form immediately after it has been freed from the woodfibers. Talc acts as a carrier, and most of the pitch and talc are sold with pulp and paper. The dosage rate is around 1% in pulp mills and 0.3% to 0.6% in paper mills.

As far as economic and environmental aspects are concerned, talc has good cost performance and allows partial substitution of chemicals. Combining its use with chemicals produces some synergistic effects. In many cases, it is most efficient to use pretreated talcs (cationic or anionic). Finding the right interaction between chemical additives and the mineral could prove important in the future.

Talc's efficiency depends on particle-size distribution, with the specific surface (a typical measurement is 10 to 17 m^2/g) and the quality of dispersion the most important parameters. Only perfectly dispersed material with the mineral's entire surface available for pitch absorption provides economic results. Since talc is hydrophobic, special techniques are needed. Adding dispersant interferes with the natural behavior, while highly concentrated slurries can be obtained only with special stirring systems. Few machine manufacturers in the world can offer good technical solutions for dispersing talc.

As an aerophilic material, talc can also be used in deinking processes, including flotation. In Europe, it is mostly used in the deinking of tissue and newsprint. Talc dosage is about 1% to 1.2%, and a high specific surface is required. Talc brightness is not as important as it is for other applications. This area requires more investigation by paper mills as well as chemical and industrial mineral producers.

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